

**EPA Superfund
Record of Decision:**

**LANGLEY AIR FORCE BASE/NASA LANGLEY
RESEARCH CENTER
EPA ID: VA2800005033
OU 31
HAMPTON, VA
09/25/2000**

RECORD OF DECISION
LANGLEY AIR FORCE BASE
OPERABLE UNIT 31 (LF-13)

September 2000

RECORD OF DECISION
LANGLEY AIR FORCE BASE
OPERABLE UNIT 31 (LF-13)

DECLARATION

SITE NAME AND LOCATION

Langley Air Force Base
Operable Unit 31 (Environmental Restoration Program [ERP], formerly Installation Restoration Program, Site LF-13)
Hampton, Virginia

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedial action for ERP Site LF-13, designated Operable Unit (OU)-31, at Langley Air Force Base (AFB) in Hampton, Virginia, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. §§9601-9675 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 Code of Federal Regulations Part 300. This decision is based on the Administrative Record for this Site.

The Virginia Department of Environmental Quality (VDEQ) concurs with the selected remedy.

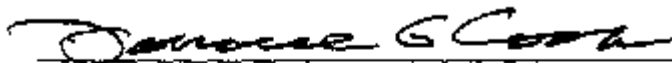
DESCRIPTION OF THE SELECTED REMEDY

OU-31 is part of a comprehensive environmental investigation and cleanup currently being performed at Langley AFB under the CERCLA program. This ROD addresses only OU-31; the other OUs located at Langley AFB are being investigated separately under its Environmental Restoration Program and will be addressed in future RODs. Additionally, this ROD addresses only soil at the OU. Groundwater is being treated as a separate OU (OU-64) and will be addressed on an installation-wide basis.

Langley AFB, the U.S. Environmental Protection Agency, and the VDEQ have determined that No Action is necessary for this Site. Risk assessment results indicate that OU-31 soils do not pose an imminent or substantial danger to public health, welfare, or the environment.

DECLARATION OF STATUTORY DETERMINATIONS

Risk assessment results from the remedial investigation performed at OU-31 indicate that no action is necessary to be protective of human health and the environment.



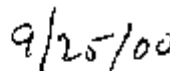
DONALD G. COOK
Lieutenant General, USAF
Vice Commander



Date



ABRAHAM FERDAS
Director
Hazardous Site Cleanup Division
U.S. Environmental Protection Agency
Region III



Date

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List of Acronyms

AFB	Air Force Base
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemicals of potential concern
EF	degrees Fahrenheit
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IRP	Installation Restoration Program
Langley AFB	Langley Air Force Base
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
ppm	part(s) per million
RBSLs	risk-based screening levels
RI	remedial investigation
ROD	Record of Decision
SI	site inspection
SVOCs	semivolatile organic compounds
VDEQ	Virginia Department of Environmental Quality
VOCs	volatile organic compounds

RECORD OF DECISION

LANGLEY AIR FORCE BASE

OPERABLE UNIT 31 (LF-13)

DECISION SUMMARY

I. Site Name, Location, and Description

Langley Air Force Base (AFB) is located near Hampton, Virginia, approximately 180 miles south of Washington, DC, and is within the Norfolk metropolitan area (Figure 1). The Base, which covers 3,152 acres, was established in 1917 and has the distinction of being the oldest continuously active AFB in the United States. The Base sits on a peninsula bounded by the northwest and southwest branches of the Back River, which is a tributary of the Chesapeake Bay. Langley AFB was proposed to be included on the National Priorities List (NPL) in 1993 and finalized in 1994. The NPL includes sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment. Operable Unit (OU)-31 was one of the Environmental Restoration Program (ERP) [formerly Installation Restoration Program (IRP)] sites investigated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at Langley AFB and was initially designated ERP (formerly IRP) Site LF-13.

The Air Force and the United States Environmental Protection Agency (EPA) are the lead agencies involved in the remedial process for Site LF-13. The Virginia Department of Environmental Quality (VDEQ) serves as a support agency. The National Superfund Database identification number for Langley AFB is VA2800005033. Funds required for remediating Site LF-13 originate from the Environmental Restoration Account.

Site LF-13, originally designated an abandoned landfill, is located in the northwest portion of Langley AFB (Figures 2 and 3). The Site is flat and wooded, and covers approximately 7.5 acres west of Gregg Road. Current land use at the Site is categorized as open space and future land use is expected to be open space and recreational.

II. Site History

This section describes the Site history and actions taken in response to CERCLA at OU-31.

A. OU History

OU-31 was originally categorized as an abandoned landfill, and was believed to have been used for approximately one month as a landfill trench.¹ An aerial photograph from 1963 shows several linear excavations evident along the northern edge of the Site and two cleared areas to the south. Aerial photographs taken from 1968 through 1996 reveal no other activities, cleared areas, or excavations. The total area of land disturbed during historical activities at the Site, as determined through aerial photograph analysis, was approximately 0.4 acre. However, following aerial photograph analysis and confirmatory trenching, it was determined that no waste had been disposed of at the Site. Therefore, OU-31 is no longer characterized as an abandoned landfill.

There are currently 23 other OUs being investigated at Langley AFB. Table 1 provides a brief summary of these OUs and Figure 2 provides the locations of these areas.

B. CERCLA Investigations

Three CERCLA investigations have been performed at OU-31. The Site was originally identified during the 1981 IRP records search for Langley AFB, but was not recommended for investigation at that time.¹ The second investigation, performed in 1995, was a site inspection (SI) and screening risk assessment.² This investigation was performed to assess the presence or absence of contamination at OU-31 resulting from past practices, determine what risks to human health and the environment existed at OU-31, and determine if further action was necessary for OU-31. The SI identified pesticides, metals, semivolatile organic compounds (SVOC), and volatile organic compounds (VOC) in surface soil. The screening level risk assessment indicated that chemicals of concern for human health included one SVOC in surface soil. Chemicals of concern for ecological health included two metals, nine pesticides, and one SVOC in surface soil. The SI report recommended additional risk assessment and evaluation of potential off-site migration of contaminants to determine the nature of potential remedial action at the Site.

The third CERCLA investigation conducted at the Site was the remedial investigation (RI). The RI was performed from July 1996 through January 1997 to further characterize potential contamination at the Site and to conduct baseline human health and ecological risk assessments.³ Surface and subsurface soil samples were collected, and two rounds of groundwater samples were collected from existing monitoring wells at the Site. Pesticides, metals, SVOCs, and VOCs were detected in soil. These CERCLA investigations have sufficiently determined the nature and extent of contamination and the RI risk assessments indicated that the OU does not pose an unacceptable risk to human health or the environment.

III. Highlights of Community Participation

In accordance with Sections 113 and 117 of CERCLA, 42 U.S.C. Sections 9613 and 9617, Langley AFB, in conjunction with the U.S. Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality (VDEQ), issued a *Proposed Plan* on May 15, 2000, presenting the preferred remedial alternative of No Action for OU-31.⁴ The *Proposed Plan* and supporting documentation were made available for review at that time and are among the documents that comprise the CERCLA Administrative Record for the Site.

The Administrative Record is available for review by the public at the following information repositories:

- **Hampton Public Library**

Reference Section, Langley AFB Information Repository
4207 Victoria Boulevard
Hampton, Virginia 23669
(757) 727-1154

Hours: Monday - Thursday, 9 a.m. - 9 p.m.
 Friday, 9 a.m. - 5 p.m.
 Saturday, 9 a.m. - 5 p.m.
 Sunday, 1 p.m. - 5 p.m.

- **Langley AFB**

Administrative Record Room

Contact: Mr. Vern Bartels

1CES/CEVR

37 Sweeney Blvd., Building No. 328

Langley AFB, Virginia 23665-2107

(757) 764-1046

Hours: Monday – Friday, 8:30 a.m. – 4 p.m.

An announcement for a public meeting, the comment period, and the availability of the Administrative Record for the remedy for OU-31 was published in the *Daily Press*, a newspaper of general circulation in Hampton, Virginia, on May 14, 2000 and in the *Flyer*, a Langley Air Force Base newspaper, on May 19, 2000.

The public comment period for the *Proposed Plan* was from May 15, 2000 to June 13, 2000. A public meeting was held at the Virginia Air and Space Center in Hampton, Virginia on June 1, 2000 to inform the public of the remedial alternatives and to seek public comments. At this meeting, representatives from EPA, VDEQ, and the Air Force were available to answer questions about conditions at the Site and the No Action proposal under consideration. Responses to the comments received during this period are included in the Responsiveness Summary section of this Record of Decision (ROD).

This ROD presents the selected remedial action for OU-31 determined in accordance with CERCLA, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). All documents considered or relied upon in reaching the remedy selection decision contained in this ROD are included in the Administrative Record for the Site and can be reviewed at the information repositories.

IV. Scope and Role of Operable Unit

OU-31 is one of the ERP sites currently being investigated under CERCLA at Langley AFB. Discrete portions of an NPL site are often managed more effectively as Operable Units. This ROD addresses OU-31, which is the ERP Site LF-13 soil OU. The remaining OUs at Langley AFB are currently being independently investigated under CERCLA (Table 1).

Risks to human health and the environment from soil at OU-31 have been evaluated, and this ROD presents the No Action proposal recommended based on risk assessment results. The RI report, which includes the human health and ecological risk assessments, documents the findings associated with OU-31. On the basis of these findings, Langley AFB, EPA and VDEQ, have determined that the Site does not pose an unacceptable risk to human health and the environment. The risk calculated under the current and future land use scenarios is below EPA's acceptable risk range.

Langley AFB, with the support of EPA and VDEQ, recommends that No Action is necessary at the Site to protect human health and the environment. Under the No Action alternative, no remedial action will be taken at OU-31. This is the planned response action for this OU. EPA and VDEQ concur with the No Action alternative proposed by Langley AFB.

This document is the result of a Langley Partnership Team effort. The Langley Partnership is the ERP decision-making body and is composed of representatives from EPA Region III, VDEQ, the U.S. Air Force Air Combat Command, Langley AFB, the U.S. Army Corps of Engineers, and environmental consultants. Several decisions on how work is to proceed at Langley AFB have been made by the team and have been documented. These signed agreements, or consensus agreements, are available for review in the Administrative Record.

V. Summary of Site Characteristics and Extent of Contamination

Summarized below are the relevant findings of the work to date with regard to contaminated soil located within the boundaries of the Site. The Conceptual Site Model (CSM) illustrating the contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human health and ecological receptors are included as Figures 5 and 6.

A. Site Characteristics

1. Geology

The Site lies within the Atlantic Coastal Plain physiographic province. Ground surface at Langley AFB is predominantly flat lying, with most of the Base lying between 5 and 8 feet above mean sea level. Drainage in the region is poor, with numerous saltwater and freshwater

marshes located along the major streams flowing into the Chesapeake Bay.

The geology of the area around Langley AFB consists of a thin layer of topsoil overlying fill materials of varying thickness placed in developed areas and unconsolidated coastal plain sediments.^{5,6} Topsoil is primarily sandy, silty clays or silty, clayey sands deposited within the flood plains during periods of higher sea-level stands or deposited in an estuarine or lagoonal environment. Fill material includes gravel, rubble, and construction debris, and is similar to native materials. The coastal plain sediments were deposited when the area was a submerged near-shore marine environment.

2. Hydrogeology

Three aquifer systems lie beneath Langley AFB, consisting of the shallow water-table aquifer (approximately 5 to 100 feet below ground surface [bgs]), the upper artesian aquifer (100 to 400 feet bgs), and the principal artesian aquifer (400 to 700 feet bgs). Groundwater in the shallow water-table aquifer beneath the Base is not currently used as a source of drinking water at the Base or within 1/2 mile of the Base.⁷ Groundwater near the coast is brackish to saline, and therefore not potable. Even though the groundwater in this area is not used as a source of drinking water, individual homeowners have groundwater wells that have been used for watering lawns and washing cars. However, the shallow water-table aquifer provides an important source of drinking water farther to the west in King Williams, Charles City, New Kent, James City, and York Counties. In Newport News and Hampton, there are areas where domestic groundwater is obtained from wells that range from 50 to 100 feet in depth. These wells are probably completed in the shallow water-table aquifer.² Groundwater flow in the shallow water-table aquifer is slow and flow direction is toward surface water bodies, including the Back River and its tributaries.

3. Meteorology

Langley AFB has a modified continental-type climate with mild winters.⁵ During both winter and summer, temperatures are fairly moderate, with winter temperatures ranging from 4 to 70 degrees Fahrenheit (EF), and summer temperatures ranging from lows of 70EF to highs of mid-80s EF. Relative humidity varies between 67 and 76 percent, depending on the month. Prevailing wind direction is from the north during winter and from the south-southwest during

the rest of the year. Precipitation ranges from 24 to 57 inches per year, and is evenly distributed throughout the year. Maximum precipitation is in July and August, with minimums in November and April. Average seasonal snowfall in the area is less than 10 inches per year.

3. Ecology

OU-31 covers approximately 7.5 acres in the northwest portion of the Base, west of Gregg Road and adjacent to the National Aeronautic and Space Administration facility. The entire Site is flat and wooded. Because there are no surface water bodies, OU-31 is considered terrestrial habitat only. The area is inhabited by deer, which are hunted in season.

5. Soils

Surface materials at OU-31 consists mostly of sand and silty sand.^{2,3} Brown sand to silty sand, brown to black silt, and brown clay fill materials mixed with construction debris comprise the upper 2.5 to 3 feet. Silty clays and sandy clays are found from approximately 3 feet to 9 feet bgs. The interval from 9 to 40 feet bgs consists of gray fossiliferous sand and silt.

B. Nature and Extent of Contamination

Six surface (0 to 0.5 feet bgs) soil samples and one subsurface soil sample were collected during the 1995 SI.² The pesticides aldrin, dieldrin, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor, heptachlor epoxide, and gamma-BHC were detected in the surface soil. The metals cadmium, mercury, and silver were detected in surface soil at concentrations exceeding background levels. SVOCs detected in the surface soil samples included benzo(a)pyrene and indeno(1,2,3-cd)pyrene. VOCs detected in the SI surface soil samples included methylene chloride, toluene, and styrene. The SI report recommended further risk assessment and evaluation of potential off-site migration of contaminants to determine the nature of potential remedial action at the Site.

During the RI, three surface (0 to 0.5 feet bgs) soil, ten subsurface (0.5 to 2 feet bgs and 2 to 4 feet bgs) soil, and five groundwater samples were collected. Pesticides, metals, SVOCs, and VOCs were detected in the RI soil samples. Arsenic was the only chemical detected in surface soil above EPA Region III human health screening levels, and it ranged from 1.41 to 4.31 parts per million (ppm). None of the metals detected in surface soil were found at concentrations

above background levels.

The pesticides 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were detected in the subsurface soil RI samples. 4,4'-DDE and 4,4'-DDT results exceeded screening levels only in the 0.5- to 2-foot depth interval. 4,4'-DDE results ranged from nondetect to 29 ppm, and 4,4'-DDT results ranged from nondetect to an estimated 31 ppm. Arsenic and beryllium were the only metals detected in subsurface soil above screening levels, and none of the metals detected in subsurface soil exceeded background levels. Styrene was the only VOC detected in the subsurface soil samples, but at concentrations below its corresponding screening level. Three SVOCs (fluorene, acenaphthylene, and bis[2-ethylhexyl]phthalate) were detected in subsurface soil, all at concentrations below screening levels. Figure 4 displays the RI subsurface soil analytical results that exceeded screening levels.

VI. Current and Potential Future Site and Resource Uses

Current land use at OU-31 is categorized as open space and future land use is expected to be open space and recreational. There are currently no restrictions regarding use at OU-31, such as fences and signs. Land adjacent to OU-31 is currently open space, and wetlands. Future adjacent land use is expected to remain the same.

VII. Summary of Site Risks

A risk assessment was conducted during the RI in accordance with the latest EPA policy on risk assessments.⁸ Health risks were based on a conservative estimate of the potential carcinogenic risk or the potential to cause other health effects not related to cancer. Carcinogenic risks and noncarcinogenic risks were evaluated. Three factors were considered:

- Nature and extent of contaminants at OU-31
- Pathways through which human and ecological receptors are or may be exposed to those contaminants at OU-31

- Potential toxic effects of those contaminants.

The human health and ecological risk assessments were based on exposure to soil.

Cancer risks are expressed as numbers reflecting the increased chance that a person will develop cancer, if he/she is directly exposed (i.e., through working at the OU) to the contaminants found in soil over a period of time. For example, EPA's acceptable risk range for Superfund sites is 1×10^{-4} to 1×10^{-6} meaning there is one additional chance in ten thousand (1×10^{-4}) to one additional chance in one million (1×10^{-6}) that a person will develop cancer if exposed to a Superfund site. The risk associated with developing other health effects is expressed as a hazard index (HI), which is the ratio of the existing level of exposure to contaminants at a site to an acceptable level of exposure. Below an HI of 1, adverse effects are not expected.

A hazard quotient (HQ) is used to evaluate ecological risks; below an HQ of 1, adverse effects to ecological receptors are not expected. For Site LF-13, HQs for mammals and birds were calculated using literature-based no-observed-adverse-effect level and lowest-observed-adverse-effect level toxicity endpoint values. HQs for terrestrial invertebrates were calculated using Langley AFB-specific critical effect values. The results of the human health and ecological risk assessments are summarized below.

A. Human Health Risk Assessment

The human health risk assessment (HHRA) was based on exposure to soil. Groundwater was also evaluated, but due to the establishment of a separate Basewide groundwater OU, groundwater will not be addressed in this ROD.

Concentrations of chemicals detected in the soil during the RI were compared to risk-based screening levels and background levels. The chemicals of potential concern (COPC) identified in soil at the Site consisted of three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) and seven metals (aluminum, arsenic, chromium, iron, manganese, thallium, and vanadium). Table 2a presents COPCs and exposure point concentrations for each of the COPCs.

Health risk levels, determined using EPA guidance to ensure that conservative estimates of potential health effects are obtained, differ depending on the assumed land use because human

exposure differs with land use. A conservative estimate of risk was developed incorporating the potential exposure pathways, which included direct skin contact with contaminated soil, incidental ingestion of soil, inhalation of contaminated soil particles, indirect contact through ingestion of fruits and berries, and ingestion of venison. Plausible receptors that may be exposed to soil at the Site and which were evaluated in the risk assessment included a utility worker, adult fisher/hunter, child fish/venison consumer, trespassing child, and on-site resident. Table 3 presents the variables used to calculate risk levels for these receptors.

Table 4 presents the results of the HHRA for OU-31. HHRA concluded that the lifetime cancer risks to the receptors from exposure to pesticides and metals in soil at Site LF-13 are 1×10^{-5} for the on-site resident, which considers both childhood and adulthood exposure, and 4×10^{-8} for the utility worker. These lifetime risks are within or below EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} . The HI for the noncarcinogenic risk due to exposure to pesticides and metals in soil is 0.02 for the adult on-site resident, 0.2 for the child on-site resident, and 0.007 for the utility worker. These HI values are all below the acceptable level of 1.0, which indicates that adverse noncarcinogenic health effects are unlikely to develop as a result of soil exposure through any of the exposure pathways.

Lifetime cancer risks from exposure to site-related chemicals in soil were determined to be negligible for the adult fisher/hunter, child fish/venison consumer and trespassing child. The HI values for the noncarcinogenic risks due to exposure to chemicals in site-related chemicals in soil were also negligible for these receptors.

In addition, a hot spot analysis was performed to evaluate risk at the location where the highest concentrations of COPCs were found. The approach used to evaluate the hot spot assumed that the receptors would be exposed to the most highly contaminated pesticide area. This approach imparts an overly conservative bias to the estimated exposure point concentration. The HHRA concluded that the cancer risk to the receptors from exposure to the pesticides in the hot spot soil are 4.7×10^{-5} for the on-site resident and 2.1×10^{-7} for the utility worker. These lifetime risks are within or below EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} . The HI for the noncarcinogenic risk due to exposure to pesticides in the hot spot soil is 0.1 for the adult on-site resident, 0.9 for the child on-site resident, and 0.035 for the utility worker. These HI values are all below the acceptable level of 1.0, which indicates that adverse noncarcinogenic health effects are unlikely

to develop as a result of soil exposure through any of the exposure pathways.

B. Ecological Risk Assessment

The ecological risk assessment at OU-31 evaluated exposure of terrestrial receptors to soil. HQs were calculated for ecological receptors, based on exposure to the contaminants in soil. Representative receptors consisted of the earthworm, deer mouse, American robin, red fox, and red-tailed hawk. Three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) and nine metals (arsenic, barium, beryllium, chromium, cobalt, iron, manganese, thallium, and vanadium) were identified as constituents of ecological concern for the Site. Table 2a presents COPCs and exposure point concentrations for each of the COPCs.

Although results indicate minimal potential risk to terrestrial receptors at the Site from these chemicals, remedial actions to reduce contaminant levels are not warranted. For the majority of the metals, concentrations detected in soil are below the naturally occurring background levels for Langley AFB. Barium, beryllium, cobalt, and thallium were detected above background levels only in subsurface soil and exposure to receptors from these metals is unlikely. Manganese does not cause adverse risk to higher trophic-level receptors through bioaccumulation. The potential risk to the hawk posed by 4,4'-DDT is minimal when considering the nature of the ecological risk assessment conducted. Most of the 4,4'-DDT contamination is in subsurface soil, resulting in a low probability of exposure. Furthermore, the risk calculations assume that the hawk feeds exclusively at the 7.5-acre Site, which is considerably less than the hawk's typical foraging range of 941 acres. Results indicate that there is minimal risk to terrestrial ecological receptors at the Site.

C. Conclusions

The overall conclusion of the RI risk assessments is that there is no adverse risk to human health and the environment due to exposure to surface and subsurface soil at OU-31. Cancer risks and noncancer hazards were estimated for plausible receptors directly or indirectly exposed to the media of interest. The human health risks calculated under current and future land use scenarios for the Site are within or below EPA's acceptable risk range. Any adverse noncarcinogenic health effects are also unlikely to develop from the OU as a result of exposure through any of the

exposure pathways. Ecological risk assessment determined that there is minimal risk to terrestrial receptors at OU-31.

With the support of EPA and VDEQ, Langley AFB has selected No Action as the preferred alternative for soil at OU-31; under this alternative, no remedial action would be undertaken there. The selection of No Action is based on the conclusion, reached by the human health and ecological risk assessments, that the soil at the Site poses no significant risk to potential human or ecological receptors; therefore, No Action would be protective human health and the environment.

Following review and consideration of the information in the Administrative Record, the requirements of CERCLA and the NCP, and the public comments received on the *Proposed Plan*, Langley AFB and EPA, in consultation with VDEQ, have selected the No Action alternative as the remedy for OU-31.

VIII. Significant Changes from Proposed Plan

The proposed remedial alternative described in the *Proposed Plan* was No Action. No significant changes to the proposed alternative were made.

IX. Responsiveness Summary

A. Overview

In a *Proposed Plan* released for public comment on May 15, 2000, Langley AFB, with the support of EPA and VDEQ, identified No Action as the preferred remedial alternative for OU-31.⁴ There were no written comments received as a result of the public comment period. There were no written comments submitted during the June 1, 2000 availability session held in Hampton, Virginia. There were no questions presented orally at the availability session concerning OU-31. After evaluating and addressing these comments, Langley AFB, with the support of EPA and VDEQ, has selected No Action as the remedy for OU-31. Comments and

the associated responses of Langley AFB, EPA, and VDEQ are described below after a brief discussion of community involvement to date.

B. Community Involvement to Date

Langley AFB, EPA and VDEQ established a public comment period from May 15, 2000 to June 13, 2000 for interested parties to comment on the OU-31 *Proposed Plan*. These and all other documents considered or relied upon during the remedy selection process for OU-31 are included in the Administrative Record, which has been established in two information repositories accessible to the public since the beginning of the public comment period for OU-31. A public meeting was held at the Virginia Air and Space Center, Hampton, Virginia, on June 1, 2000 to present the *Proposed Plan*, answer questions, and accept both oral and written comments on the OU-31 remedial alternative. This Responsiveness Summary, required by CERCLA, provides a summary of citizens' comments received during the public meeting and the responses of the Langley AFB, EPA, and VDEQ. Responses to these comments are included in the section below.

C. Summary of Comments Received During Public Comment Period and Comment Responses

In the public meeting held on June 1, 2000, two proposed plans for Langley AFB were presented. One was for OU-31 (ERP Site LF- 13), and the other was for OU-24 (ERP Site OT-06 and OT-06 Annex). No comments received pertaining to OU-31 during the public meeting or the public comment period.

APPENDIX A

Tables

Table 1

**Summary of Operable Units Under CERCLA Investigation
Langley Air Force Base, Virginia**

(Page 1 of 2)

OU Name/IRP Site Name	Findings	Current Status
OU-21/LF-01 Former Landfill, End of 08/26 Runway	Contaminants of Potential Concern (COPCs) - pesticides and metals in the groundwater and soil.	In the remedial investigation (RI)/feasibility study (FS) phase. A draft final RI report has been submitted and reviewed. A FS is in progress.
OU-22/WP-02 Former Waste Water Treatment Plant, Bldg. 724	COPCs - pesticides and metals in the groundwater and soil.	In the RI phase. A draft RI report was submitted in April 2000.
OU-23/LF-05 Former Landfill in the Shellbank Area	COPCs - pesticides, volatile organic compounds (VOCs), and metals in the groundwater; pesticides and metals in the surface water; and semivolatile organic compounds (SVOCs) and metals in the soil.	In the RI/FS phase. A draft final RI report has been submitted and reviewed. A FS was submitted in May 2000.
OU-24/OT-06 Former Entomology Site, Shellbank Area	COPCs - pesticides, VOCs, SVOC, and some metals in the groundwater; SVOCs, pesticides and some metals in the soil.	In the ROD phase.
OU-25/LF-07 Former Landfill, Shellbank Area	COPCs - pesticides and some metals in the groundwater; dieldrin in the soil.	In the RI/FS phase. A final RI report was submitted in May 2000. A FS was submitted in April 2000.
OU-26/WP-08 Former Waste Water Treatment Plant, Lighter Than Air (LTA) Area	COPCs - some pesticides and metals in the groundwater; dieldrin in the soil.	In the RI/FS phase. A draft final RI report was submitted in January 2000. A final RI report is scheduled to be submitted in summer 2000. A FS is in progress.
OU-28/LF-10 Former Landfill, Golf Course	COPCs - VOCs, metals and some pesticides in the groundwater; VOCs and polychlorinated biphenyls (PCBs) in surface water; some metals in the soil.	In the RI/FS phase. A final RI report was submitted in May 2000. A FS was submitted in April 2000.
OU-29, LF-11 Former Landfill, Tabbs Creek Area	COPCs - VOCs, pesticides, metals and PCBs in the groundwater; some metals in the surface water; SVOCs, metals, and PCBs in the soil.	In the RI/FS phase. A final RI report was submitted in May 2000. A FS was submitted in April 2000.
OU-30/LF-12 Former Landfill, Munitions Storage area, Northwest Area of Base	COPCs - VOCs and metals in the groundwater; metals and 2,4 DB in the surface water; SVOCs and nickel in the soil.	In the RI/FS phase. A final RI report was submitted in May 2000. A FS was submitted in April 2000.
OU-31/LF-13 Former Landfill Munitions Storage Area, Northwest Area of Base	COPCs - Aldrin, alpha-BHC and some metals in the groundwater; VOCs, SVOCs, metals and PCBs in the surface water.	In the ROD phase.
OU-32/WP-14 Former Chemical Leach Pit, Firing-In Abutment, Building 1303	COPCs - pesticides, SVOCs, and some metals in the groundwater; arsenic and dieldrin in the soil.	In the RI/FS phase. A draft final RI report was submitted in January 2000. A final RI report is scheduled to be submitted in summer 2000. A FS is in progress.
OU-33/LF-15 Former Landfill, Willoughby Point	COPCs - VOCs, SVOCs, pesticides and metals in the groundwater; pesticides and metals in the surface water.	In the RI/FS phase. A draft final RI report has been submitted and reviewed. A FS was submitted in May 2000.
OU-34/LF-17 Former Landfill, LTA Area	COPCs - VOCs, pesticides and some metals in the groundwater; dieldrin and some metals (mainly lead) in the soil.	In the RI phase. A draft RI report was submitted in April 2000 and is in review.

Table 1
Summary of Operable Units Under CERCLA Investigation
Langley Air Force Base, Virginia

(Page 2 of 2)

OU Name/IRP Site Name	Findings	Current Status
OU-35/L-18 Former Landfill, Northwest corner of Base	COPCs - pesticides in the groundwater; pesticides and metals in the surface water; SVOCs and manganese in the surface soil; delta-BHC, and metals in the sediment.	In the RI/FS phase. A draft final RI report has been submitted and reviewed. A FS was submitted in May 2000.
OU-37/LF-22 Former Landfill, Willoughby Point	COPCs - pesticides and metals in the groundwater; alpha-BHC, delta-BHC and metals in the surface water.	In the RI/FS phase. A draft final RI report has been submitted and reviewed. A FS was submitted in May 2000.
OU-40/OT-25 Old Entomology Building and Former Storage area, Bldg. 965	COPC - pesticides in the groundwater and soil.	In the RI/FS phase. A draft RI report has been submitted and reviewed. The document is being revised in response to the comments.
OU-42/OT-38A and B Four Waste Oil and Trash Burn Areas, Basewide	Risk assessments showed no significant risk to human health or the environment from soils	The ROD was signed in January 1999.
OU-44/FT-41 Former Fire Training Area, Firing-In Abutment, Bldg. 1303	COPCs - VOCs, pesticides, dioxins, and some metals in the groundwater; SVOCs, dioxins and some metals in the surface water.	In the RI/FS phase. A draft final RI report has been submitted and reviewed. A FS was submitted in May 2000.
OU-47/OT-51 Former Electrical Substation, Shellbank Area, Bldg. 82	COPCs - pesticides, PCBs and lead in the soil.	The ROD was signed in January 1999.
OU-48/OT-55 Civil Engineering Yard, Underground Petroleum Contamination	COPCs - pesticides and dieldrin in the groundwater; pesticides and PCBs in the soil.	In the RI phase. A draft RI report was submitted in June 2000 and is in review.
OU-49/OT-56 Silver Contamination in Storm Sewers, Basewide	COPCs - metals and VOCs in surface water and metals, SVOCs and pesticides in sediment.	The final Phase II ecological risk assessment report was submitted in July 2000.
OU-50/SS-61 Old Civil Engineering Paint Shop/Marina	COPCs - VOCs in the groundwater and soil.	The ROD was signed in September 1999. The Memorandum of Agreement on Land-Use Controls have been submitted and is in review.
OU-51/SS-63 Back River Sediments	COPCs - pesticides, metals, and PCTs in the sediment.	In the RI/FS stage. The draft work plan was submitted in June 2000.
OU-52/OT-64 Groundwater Contamination, Basewide	COPCs - pesticides and metals in the groundwater.	In the planning phase. The final single-sampling event work plan was submitted in June 2000. The revised draft long-term monitoring work plan was submitted in July 2000.

Table 2a

**Summary of Chemicals of Potential Concern
(Human Health)
Langley Air Force Base, Virginia**

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection
		Min	Max		
Soil On-Site Direct Contact	Aluminum	3.33E+03	4.17+04	ppm	13/13
	Arsenic	1.30E+00	1.42E+01	ppm	13/13
	Chromium	7.12E+02	6.85E+03	ppm	13/13
	Iron	3.48E+03	1.11E+05	ppm	13/13
	Manganese	8.00E+00	1.87E+03	ppm	13/13
	Thallium	1.5E+00	9.40E+00	ppm	7/13
	Vanadium	1.18E+01	7.94E+01	ppm	13/13
	4,4'-DDD	1.00E-02	2.30E+01	ppm	5/13
	4,4'-DDE	1.90E-03	2.90E-01	ppm	9/13
	4,4'-DDT	6.70E-03	3.10E+01	ppm	4/13

Table 2b
Summary of Chemicals of Potential Concern
(Ecological)
Langley Air Force Base, Virginia

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection
		Min	Max		
Soil On-Site Direct Contact	Arsenic	1.30E+00	1.42E+01	ppm	13/13
	Barium	2.32E+01	1.76E+02	ppm	8/13
	Beryllium	7.4E-01	1.9E+00	ppm	5/13
	Chromium	7.12E+02	6.85E+03	ppm	13/13
	Iron	3.48E+03	1.11E+05	ppm	13/13
	Manganese	8.00E+00	1.87E+03	ppm	13/13
	Thallium	1.5E+00	9.40E+00	ppm	7/13
	Vanadium	1.18E+01	7.94E+01	ppm	13/13
	4,4'-DDD	1.00E-02	2.30E+01	ppm	5/13
	4,4'-DDE	1.90E-03	2.90E-01	ppm	9/13
	4,4'-DDT	6.70E-03	3.10E+01	ppm	4/13

Table 3
Variables Used to Estimate Potential Chemical Intakes
and Contact Rates for Receptors at ERP Site LF-13 (OU-31)
Langley Air Force Base, Virginia

(Page 1 of 5)

Pathway Variable	Utility Worker	Adult Fisher/ Hunter	Child Fish/Venison Consumer	Trespassing Child	On-Site Resident
General Variables					
EF (days/year)	29 ^a	RME Direct Pathways: 14 ^a RME Indirect Pathways: 350 ^b CT Indirect Pathways: 234 ^c	RME: 350 ^b CT: 234 ^c	RME Direct Pathways: 50 ^a RME Indirect Pathways: 350 ^b CT Indirect Pathway: 234 ^c	RME: 350 ^b CT: 234 ^c
ED (years)	1 ^a	RME: 30 ^b CT: 9 ^c	RME: 9 ^a CT: 2.7 ^a	RME: 12 ^a CT: 9 ^c	Adult RME: 30 ^b Adult CT: 9 ^c Child RME: 6 ^d Child CT: 1.8 ^a
BW (kg)	70 ^b	70 ^b	18.5 ^e	43 ^e	Adult : 70 ^b Child: 15 ^d
AT Noncancer (days) ^f	365	RME: 10,950 CT: 3,285	RME: 3,285 CT: 986	RME: 4,380 CT: 3,285	Adult RME: 10,950 Adult CT: 3,285 Child RME: 2,190 Child CT: 657
AT Cancer (days) ^g	25,550	25,550	25,550	25,550	Age Adjusted Resident 25,550
Inhalation of Resuspended Dust from Soil					
IR _a (m ³ /hour)	2.5 ^b	NA	NA	NA	NA
Fl _a (unitless)	1 ^a	NA	NA	NA	NA
ET _a (hours/day)	8 ^a	NA	NA	NA	NA

Table 3

**Variables Used to Estimate Potential Chemical Intakes
and Contact Rates for Receptors at ERP Site LF-13 (OU-31)
Langley Air Force Base, Virginia**

(Page 2 of 5)

Pathway Variable	Utility Worker	Adult Fisher/ Hunter	Child Fish/Venison Consumer	Trespassing Child	On-Site Resident
Ingestion of COPC in Soil (Age Adjusted Resident - Cancer Evaluation)					
IngF _w (mg-year/kg-day)	NA	NA	NA	NA	RME: 114 ^d CT: 17 ^a
Fl _w (unitless)	NA	NA	NA	NA	1 ^a
Incidental Ingestion of COPC in Soil					
IR _s (mg/day)	480 ^c	RME: 100 ^b CT: 50 ^e	NA	RME: 100 ^b CT: 50 ^e	Adult RME: 100 ^b Adult CT: 50 ^c Child RME: 200 ^b Child CT: 100 ^c
Fl _s (unitless)	1 ^a	0.5 ^a	NA	0.17 ^a	1 ^a
Ingestion of COPC in Drinking Water (Age Adjusted Resident - Cancer Evaluation)					
IRF _w (L-year/kg-day)	NA	NA	NA	NA	RME: 109 ^d CT: 0.26 ^a
Fl _w (unitless)	NA	NA	NA	NA	1 ^a
Ingestion of COPC in Drinking Water					
IR _w (L-day)	NA	NA	NA	NA	Adult RME: 2 ^d Adult CT: 1.4 ^e Child RME: 1 ^d Child CT: 1 ^a

Table 3

**Variables Used to Estimate Potential Chemical Intakes
and Contact Rates for Receptors at ERP Site LF-13 (OU-31)
Langley Air Force Base, Virginia**

(Page 3 of 5)

Pathway Variable	Utility Worker	Adult Fisher/ Hunter	Child Fish/Venison Consumer	Trespassing Child	On-Site Resident
Fl _w (unitless)	NA	NA	NA	NA	1 ^c
Ingestion of COPC in Wild Berries and Fruits					
IR _p (dry matter: g/day)	NA	20 ^a	NA	20 ^a	NA
Fl _p (unitless)	NA	0.025 ^a	NA	0.025 ^a	NA
Ingestion of COPC in Venison					
IR _v (g/day)	NA	16 ^a	16 ^a	NA	NA
Fl _v (unitless)	NA	1 ^a	1 ^a	NA	NA
Dermal Uptake of COPC from Soil (Age Adjusted Resident - Cancer Evaluation)					
SFS _{adj} (cm ² -year/kg-day)	NA	NA	NA	NA	RME: 2700 ^h CT: 800 ^h
Fl _d (unitless)	NA	NA	NA	NA	1 ^a
AF (mg/ch ²)	NA	NA	NA	NA	0.2 ^h
ABS (unitless)	NA	NA	NA	NA	csv
Dermal Uptake of COPC from Soil					
SA (cm ²)	2000 ^h	2000 ^h	NA	3275 ^h	Adult: 5000 ^h Child: 2400 ^h
Fl _d (unitless)	1 ^a	0.5 ^a	NA	0.17 ^a	1 ^a

Table 3

**Variables Used to Estimate Potential Chemical Intakes
and Contact Rates for Receptors at ERP Site LF-13 (OU-31)
Langley Air Force Base, Virginia**

(Page 4 of 5)

Pathway Variable	Utility Worker	Adult Fisher/ Hunter	Child Fish/Venison Consumer	Trespassing Child	On-Site Resident
AF (mg/cm ²)	0.2 ^h	0.2 ^h	NA	0.2 ^h	0.2 ^h
ABS (unitless)	csv	csv	NA	csv	csv
Dermal Uptake of COPC from Surface Water					
SA (cm ²)	NA	NA	NA	13100 ^e	NA
Fl _d (unitless)	NA	NA	NA	1 ^a	NA
PC (cm/hour)	NA	NA	NA	csv	NA
ET _d (hours/day)	NA	NA	NA	1.33 ^a	NA
Dermal Uptake of COPC from Groundwater (Age Adjusted Resident - Cancer Evaluation)					
SFW _{adj} (cm ² -year/kg-day)	NA	NA	NA	NA	RME: 10,000 ^a CT: 2,900 ^a
Fl _d (unitless)	NA	NA	NA	NA	1 ^a
PC (cm/hour)	NA	NA	NA	NA	csv
ET _d (hours/day)	NA	NA	NA	NA	RME: 0.33 ^d CT: 0.17 ^h

Table 3

**Variables Used to Estimate Potential Chemical Intakes
and Contact Rates for Receptors at ERP Site LF-13 (OU-31)
Langley Air Force Base, Virginia**

(Page 5 of 5)

Pathway Variable	Utility Worker	Adult Fisher/ Hunter	Child Fish/Venison Consumer	Trespassing Child	On-Site Resident
Dermal Uptake of COPC from Groundwater					
SA (cm ²)	2000 ^h	NA	NA	NA	Adult: 20,000 ^h Child: 7,300 ^h
PC (cm/hour)	cvs	NA	NA	NA	CSV
ET _d (hours/day)	2a	NA	NA	NA	RME: 0.33 ^d CT: 0.17 ^h

NA = Not Applicable; cvs = Chemical-Specific Value.

^aAssumed; see text.

^bU.S. Environmental Protection Agency (EPA), 1991, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors*, Interim Final, Office of Solid Waste and Emergency Response, OSWER Directive: 9285.6-03.

^cU.S. Environmental Protection Agency (EPA), 1993, *Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure*, Preliminary Review Draft (5/5/93).

^dU.S. Environmental Protection Agency (EPA), 1999, *Risk-Based Concentration Table*, October, EPA Region II, Philadelphia, PA, on-line.

^eU.S. Environmental Protection Agency (EPA), 1999, *Exposure Factors Handbook*, Office of Health and Environmental Assessment, Washington, DC, EPA/600/8-89/043.

^fCalculated as the product of ED (years) x 365 days/year.

^gCalculated as the product of 70 years (assumed human lifetime) (EPA, 1989, *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual [Part A]*, Interim Final, Office of Emergency and Remedial Response, Washington, DC, EPA/540/1-8/002, 1989) x 365 days/year).

^hU.S. Environmental Protection Agency (EPA), 1992, *Dermal Exposure Assessment: Principles and Applications*, Interim Report, Office of Research and Development, Washington, DC, EPA/600/8-91/011B, including Supplemental Guidance dated August 18, 1992.

Table 4

**Summary of Site-Related RME Cancer Risk and Noncancer Hazard
for ERP Site LF-13 (OU-31)
Langley Air Force Base, Virginia**

Receptor	Cancer Risk:	Cancer Risk Considering the Hot Spot:
	Total Soil ILCR	Total Soil ILCR
On-Site Resident (Age- Adjusted)	1.01E-05	4.69E-05
Adult Fisher/Hunter	NA	NA
Child Fish/Venison Consumer	NA	NA
Trespassing Child	NA	NA
Utility Worker	4.49E-08	2.09E-07
	Noncancer Hazard:	Noncancer Hazard Considering the Hot Spot:
	Total Soil HI	Total Soil HI
On-Site Adult Resident	2.43E-02	1.13E-01
On-Site Child Resident	1.84E-01	8.56E-01
Adult Fisher/Hunter	NA	NA
Child Fish/Venison Consumer	NA	NA
Trespassing Child	NA	NA
Utility Worker	7.45E-03	3.47E-02

HI - Hazard index.

ILCR - Incremental Lifetime cancer risk.

NA - Not applicable.

RME - Reasonable maximum exposure.

Total soil - Surface soil and subsurface soil.

APPENDIX B
Figures

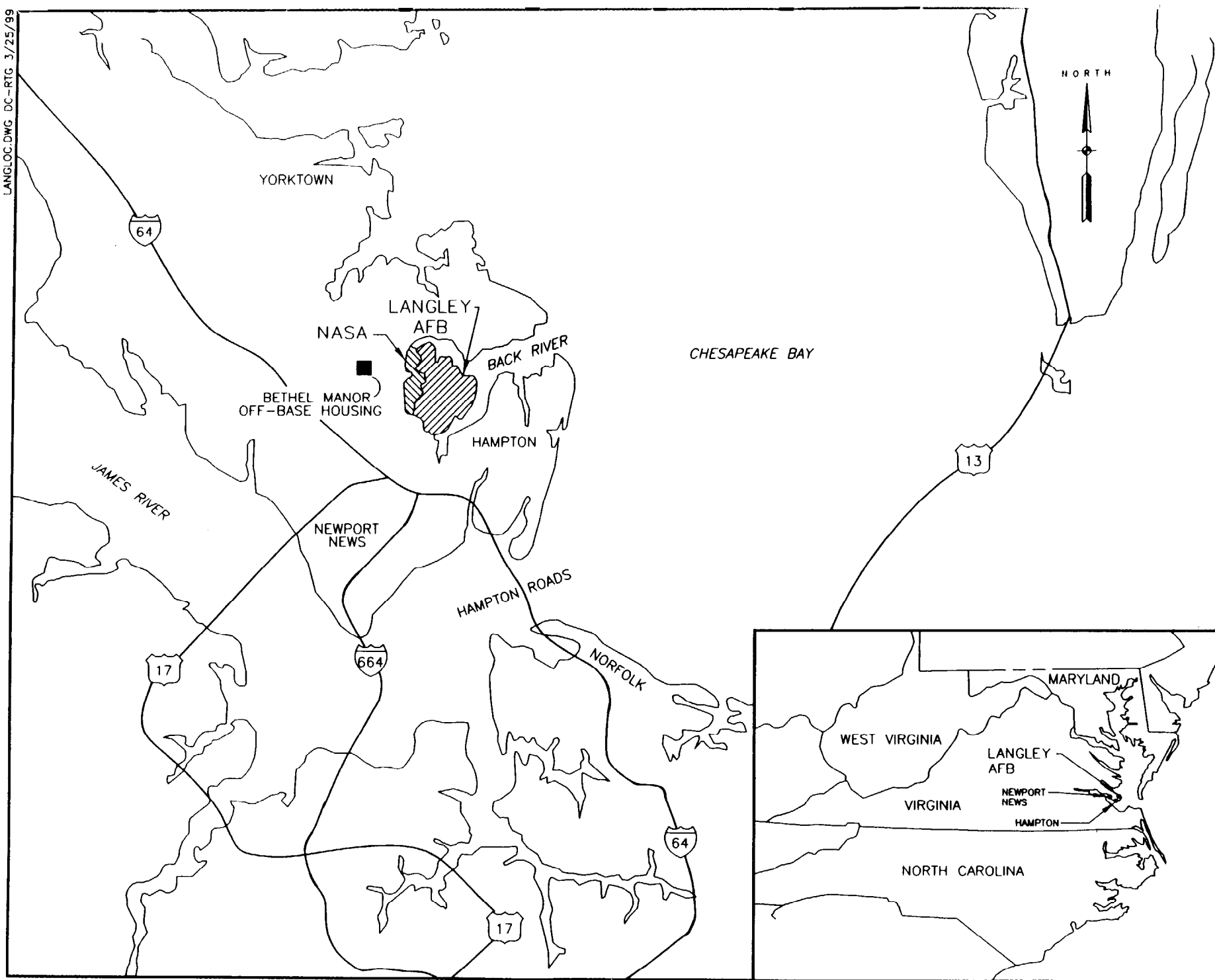
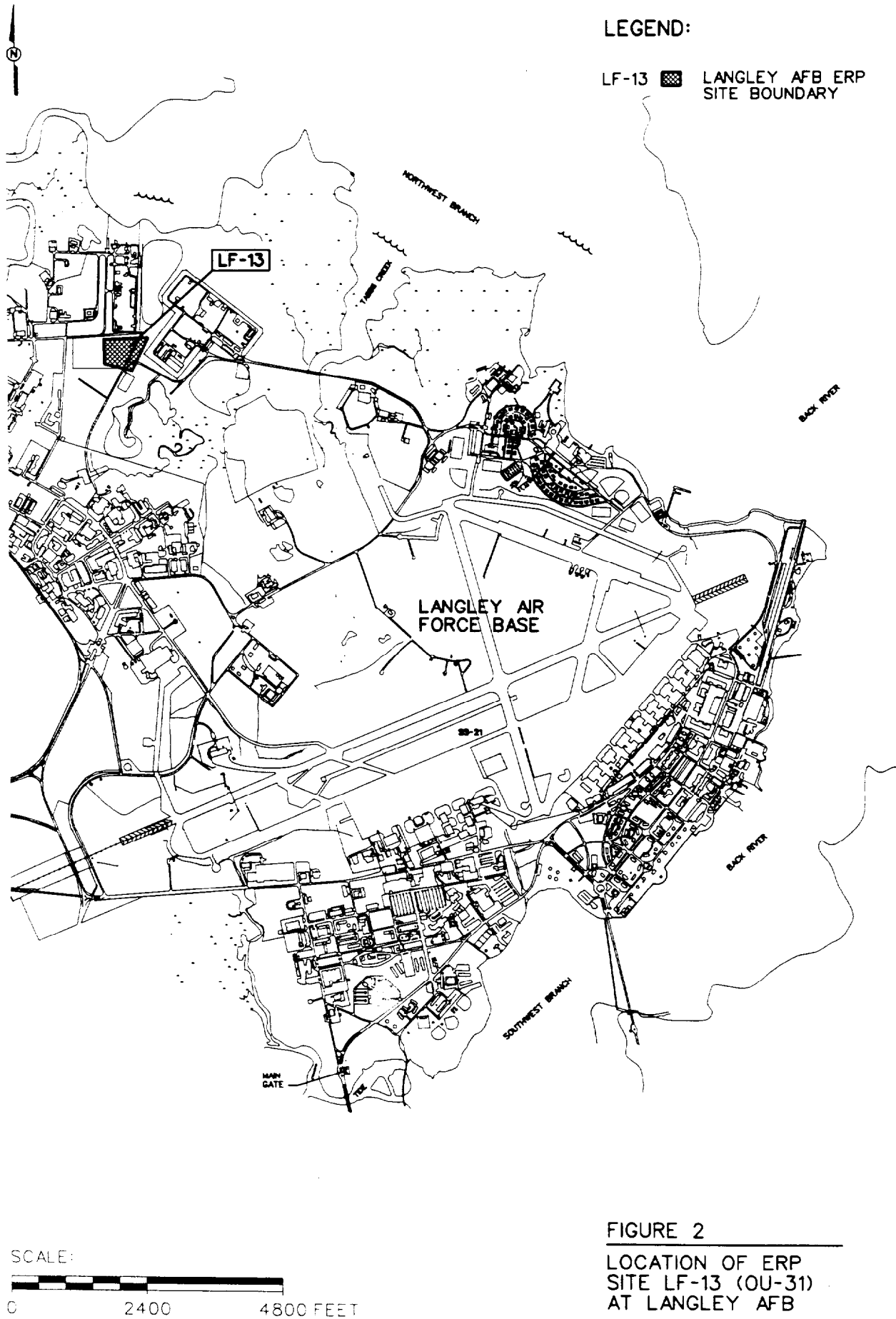


Figure 1. Location Map, Langley Air Force Base, Virginia

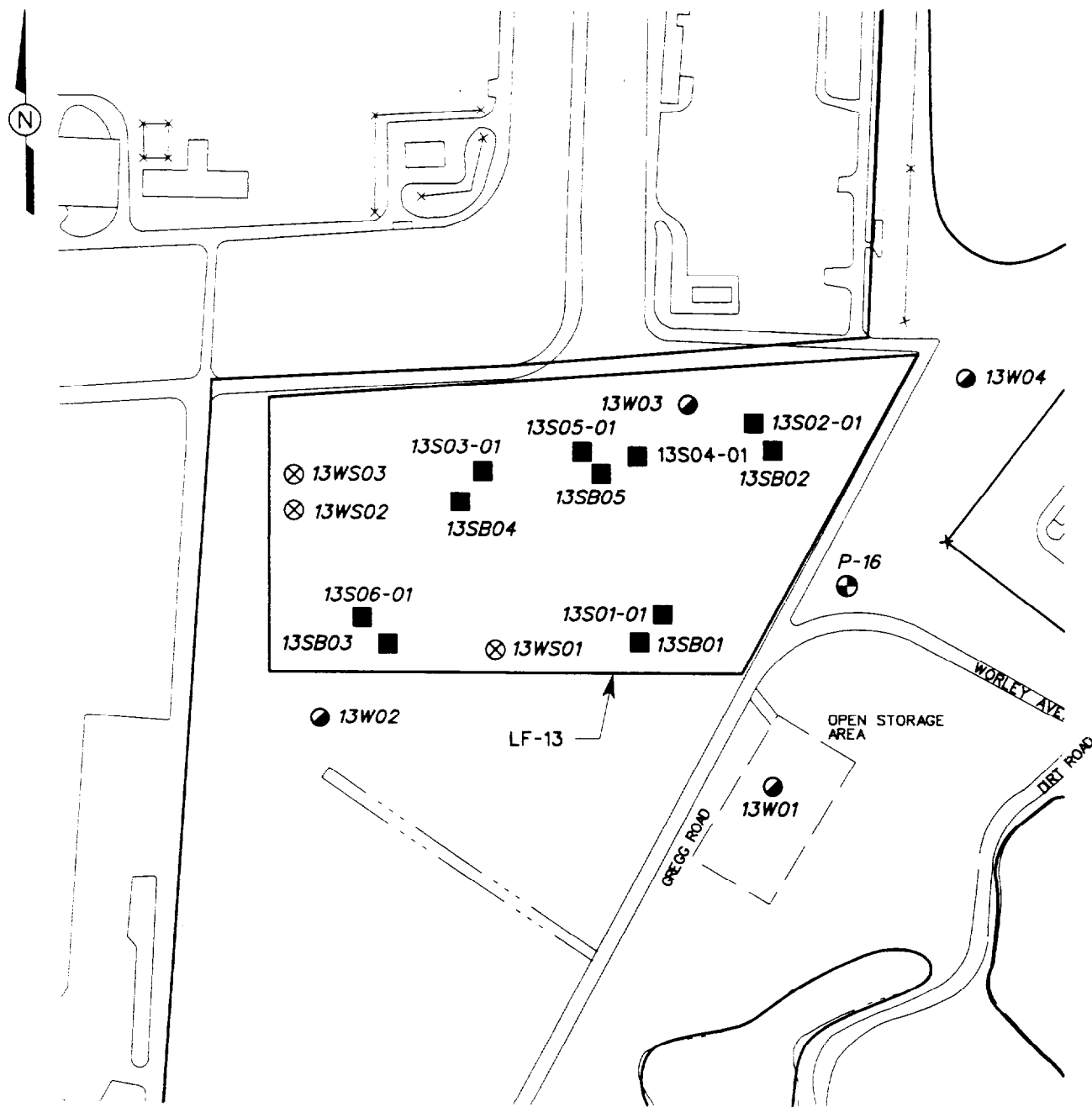
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PREPARED BY: IT CORPORATION



STARTING DATE: 8/27/98	DATE LAST REV: 08/09/00	DRAFT CHECK BY: C. TUMLIN	INITIATOR: A. MAYILA	DWG. NO.: V773896ES.029
DRAWN BY: S. MCCAWLEY	drawn BY: dholi	ENGR CHECK BY: HORBURNSEN	PROJ MGR: BOWHOLTZ	PROJ. NO.: 773896

PREPARED BY: IT CORPORATION



LEGEND:

- SUBSURFACE SOIL SAMPLING LOCATION
- ⊗ SURFACE SOIL SAMPLING LOCATION
- MONITORING WELL LOCATION
- ⊕ ABANDONED MONITORING WELL LOCATION

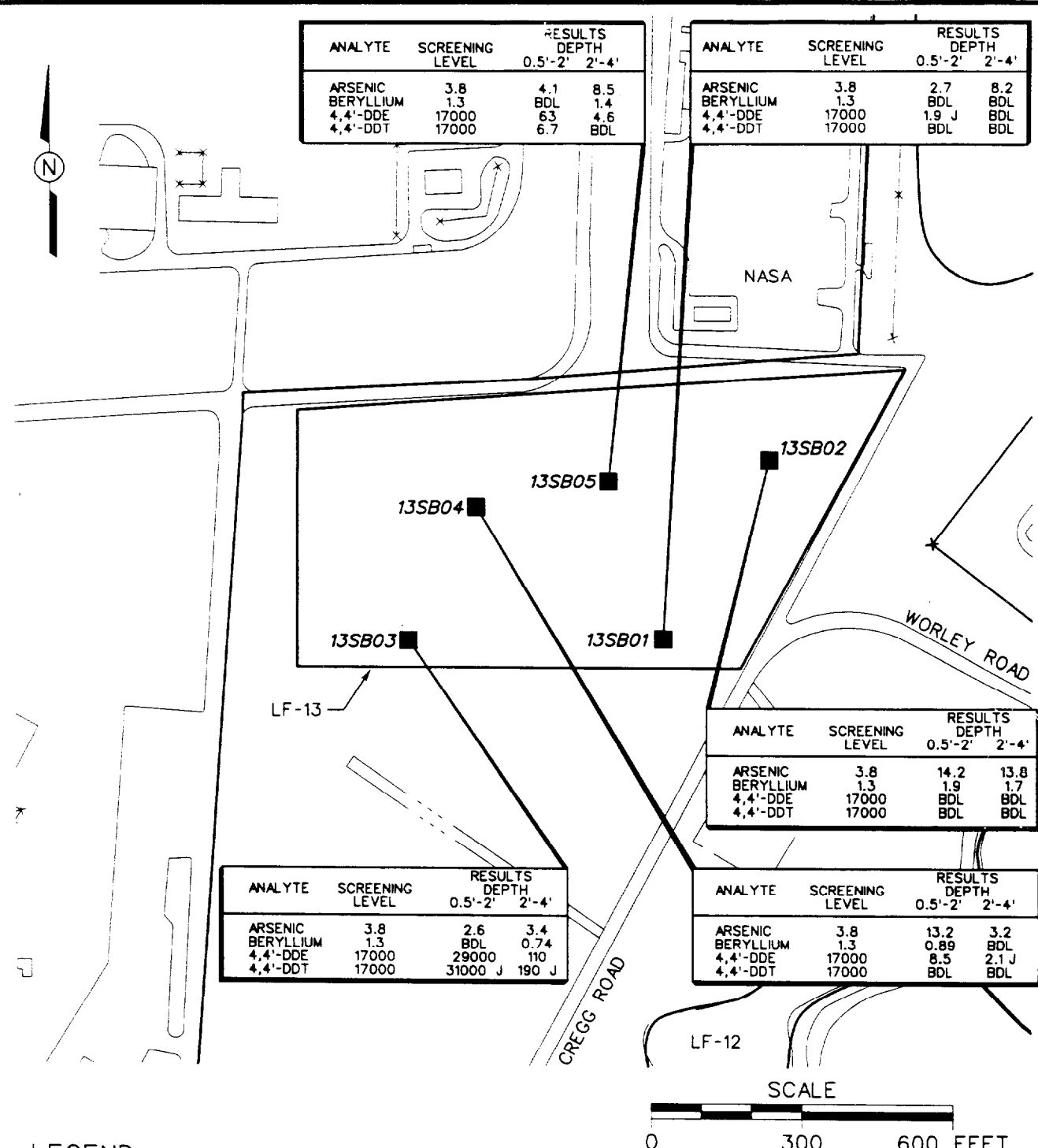
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0 300 600 FEET

FIGURE 3

SITE MAP OF ERP SITE
LF-13 (OU-31) SHOWING
SAMPLING LOCATIONS

UNITED STATES AIR FORCE
LANGLEY AIR FORCE BASE
HAMPTON, VIRGINIA

STARTING DATE: 4/14/00
 DRAWN BY: M. CRAFT
 DATE LAST REV: 08/09/00
 DRAFT CHECK BY: C. LUMLIN
 INITIATOR: THORBJORNSEN
 DWG. NO.: 171384ES.035
 PROJ. NO.: 1713896
 PROJ. MGR.: D. BOWHOLT
 ENGR. CHECK BY: THORBJORNSEN
 DRAWN BY: dhall



LEGEND:

- SUBSURFACE SOIL SAMPLING LOCATION
- BDL BELOW DETECTION LIMIT
- J (ORGANIC) ANALYTE PRESENT. REPORTED VALUE MAY NOT BE ACCURATE OR PRECISE.

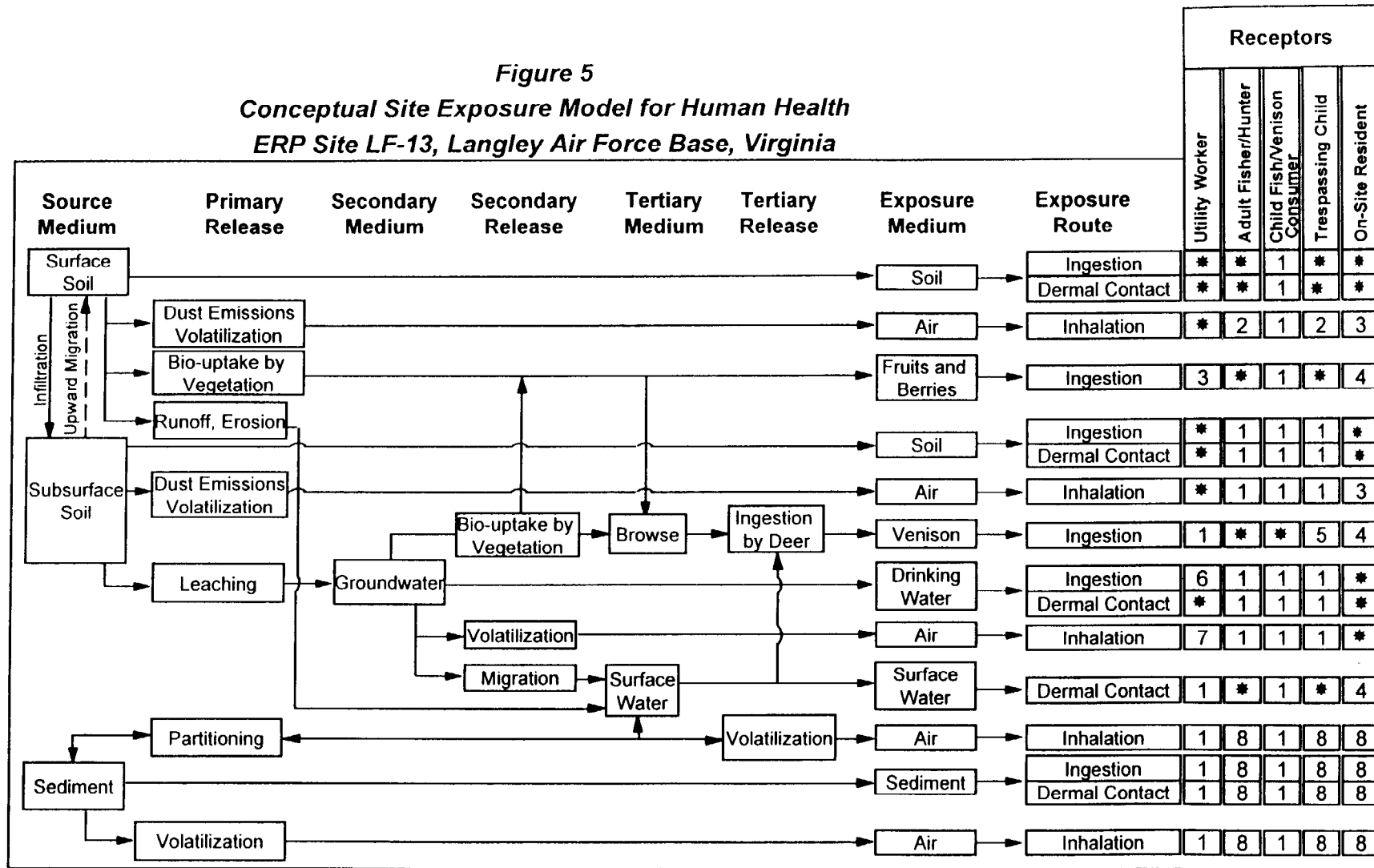
NOTE:

INORGANIC CONCENTRATIONS ARE PROVIDED IN mg/kg.
 ORGANIC CONCENTRATIONS ARE PROVIDED IN ug/kg.

FIGURE 4
 SUBSURFACE SOIL ANALYTICAL RESULTS ABOVE SCREENING LEVELS AT ERP SITE LF-13 (OU-31) (JULY-AUGUST 1996)

UNITED STATES AIR FORCE
 LANGLEY AIR FORCE BASE
 HAMPTON, VIRGINIA

Figure 5
Conceptual Site Exposure Model for Human Health
ERP Site LF-13, Langley Air Force Base, Virginia



* = Complete exposure pathway evaluated in baseline risk assessment.

1 = Incomplete exposure pathway.

2 = Although theoretically complete, this pathway is not evaluated because soil emission of dust and VOCs is not expected to be significant for this receptor.

3 = Receptor's contact with this medium would be sporadic; this pathway is not quantified.

4 = Potential exposure may be identical to that of the Adult Fisher/Hunter and is not quantified separately for the resident.

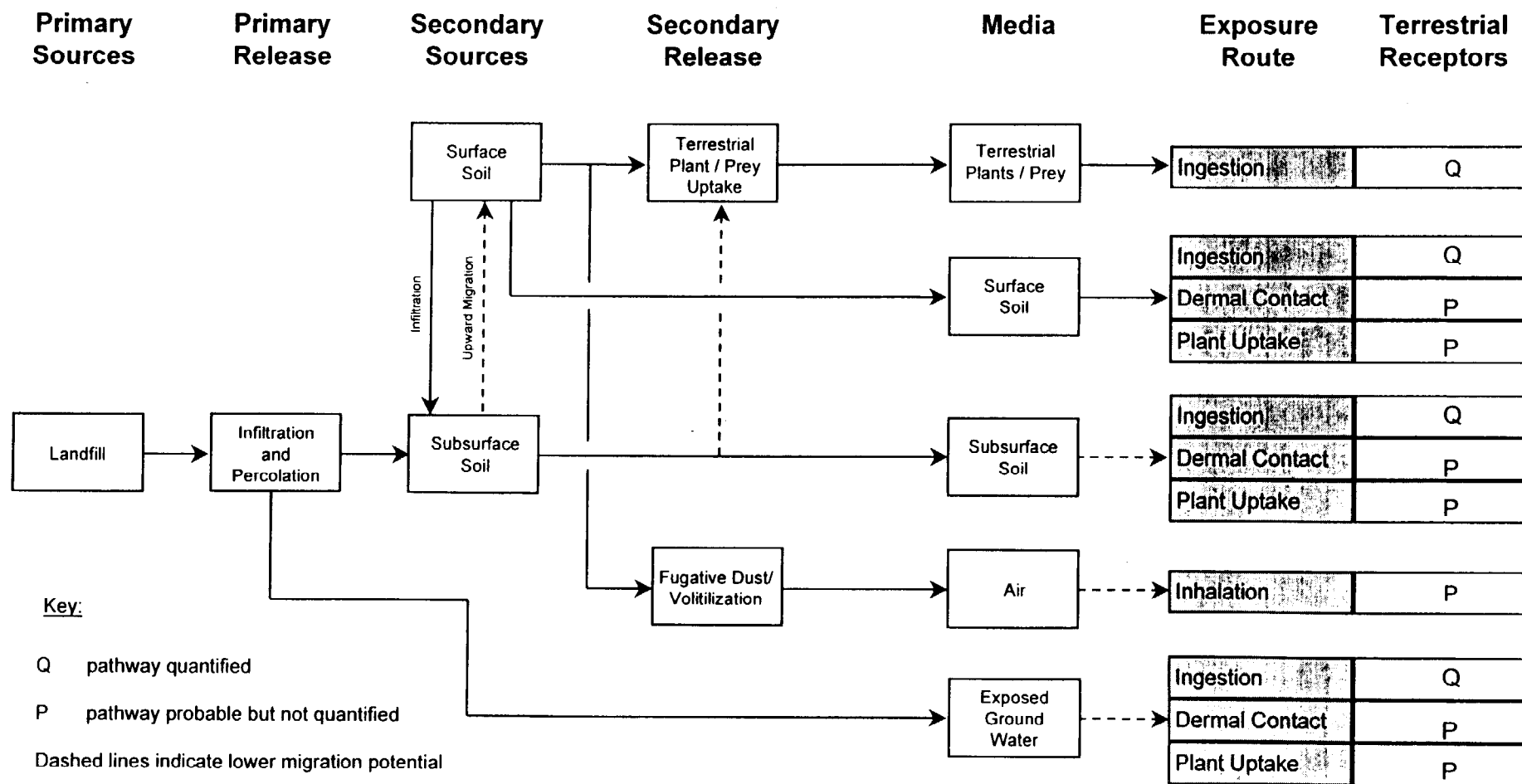
5 = Although a young child trespasser is unlikely to hunt or fish, an older child trespasser has potential exposure to this scenario and is quantified under the Adult Hunter/Fisher.

6 = Model used to estimate dermal uptake is considered to provide sufficient protection for incidental ingestion.

7 = Theoretically complete exposure pathway, but large dilution factor of outdoor air obviates the need to quantify this pathway.

8 = Surface water/sediment was not present at time of sampling. Therefore, no potential exposure to sediment.

Figure 6
Ecological Conceptual Site Model
ERP Site LF-13
Langley Air Force Base, Virginia



APPENDIX C

GLOSSARY

Administrative Record: A collection of documents containing all the information and reports generated during the entire phase of investigation and cleanup at the site that are used to make a decision on the selection of a response action under CERCLA.

Carcinogenic Risk: Cancer risks are expressed as numbers reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, EPA's acceptable risk range for Superfund sites is 1×10^{-4} to 1×10^{-6} , meaning that there is one additional chance in ten thousand (1×10^{-4}) to one additional chance in one million (1×10^{-6}) that a person will develop cancer if exposed to a site that is not remediated.

Chemicals of Potential Concern (COPC): Chemicals, either present at the site as a result of historical activities or of likely concern to human health and the environment, that are evaluated in the risk assessment.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A federal law, commonly referred to as the "Superfund Program," passed in 1980 that provides for the cleanup and emergency response in connection with numerous existing inactive hazardous waste disposal sites that endanger public health and safety of the environment.

Ecological Risk Assessment: An evaluation of the risk posed to the environment if remedial activities are not performed at the site.

Environmental Restoration Program (ERP) [formerly Installation Restoration Program (IRP)]: The program established by the United States Air Force to systematically identify and remediate contaminated sites. The ERP was designed to be consistent with EPA rules and guidelines.

Exposure Pathways: Describes the course a chemical or physical agent takes from the source to the exposed individual. Elements of the exposure pathway are: (1) the source of the released chemical; (2) the contaminated medium (e.g., soil); (3) a point of contact with the contaminated medium; and (4) an exposure route (e.g., ingestion, inhalation) at a contact point.

Hazard Index (HI): A number indicative of noncarcinogenic health effects that is the ratio of the existing level of exposure to an acceptable level of exposure. A value equal to or less than one indicates that the human population is not likely to experience adverse effects.

Hazard Quotient (HQ): A number used to evaluate ecological risks based on exposure to site-related contaminants. A value less than one indicates that ecological receptors are not likely to experience adverse effects.

Human Health Risk Assessment: An evaluation of the risk posed to human health should remedial activities not be implemented.

National Priorities List (NPL): A list, developed by EPA, of uncontrolled hazardous substances release sites in the United States that are considered priorities for long-term remedial evaluation and response.

Operable Unit (OU): A discrete portion of a site or a discrete action representing an incremental step in the investigation and remediation of hazardous substances at a facility.

Proposed Plan: A document that presents a proposed cleanup alternative and requests public input regarding the proposed alternative.

Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for the choice of that remedy, and public comment on alternative remedies.

Remedial Action: Implementation of plans and specifications, developed as part of the design, to remediated a site.

Remedial Investigation (RI): A study of a facility that supports the selection of a remedy for a site where hazardous substances have been disposed. The RI identifies the nature and extent of contamination at the facility.

Risk-Based Screening Level (RBSL): Risk-based concentrations established by the EPA associated with specific levels of risk. These concentrations have been developed for a variety of exposure scenarios, including ingestion and inhalation. They are used to screen chemicals for inclusion in the risk assessment.

Site: The facility and any other areas in close proximity to the facility where a hazardous substance, hazardous waste, hazardous constituent, pollutant, or contaminant from the facility has been deposited, stored, disposed of, or placed or has migrated or otherwise come to be located.

Site Inspection (SI): A study that determines if the site requires prompt response action because the site may pose an immediate threat to human health and/or the environment.

Site-Related Risk: Cancer and noncancer risk estimates that are based on contaminants present in environmental media due to site-specific human activities at Langley AFB, but that exclude the contribution of background contaminant concentrations.

Superfund Amendments and Reauthorization Act (SARA): An amendment to CERCLA enacted in 1986.

Trophic-Level: A community of organisms or species that occupy the same or similar feeding guild.

APPENDIX D

References

¹*Installation Restoration Program Records Search for Langley Air Force Base, Virginia*, CH2M Hill, June 1981.

²*Site Inspection and Screening Risk Assessment Report for 33 Installation Restoration Program Sites, Draft, Langley Air Force Base, Virginia*, Radian Corporation, February 1996.

³*Final Remedial Investigation Report for IRP Site LF-13, Langley Air Force Base, Virginia*, IT Corporation, February 2000.

⁴*No Action Proposed Plan for Operable Unit 31 (IRP Site LF-13), Langley Air Force Base, Virginia*, Langley Air Force Base, March 2000.

⁵*Langley Air Force Base Basewide Standard Operating Procedures: Background Information Document*, Versar, Inc., January 19, 1996,

⁶*Hydrogeologic Framework of the Shallow Aquifer System of York County, Virginia*, A. R. Brockman and D. L. Richardson, U. S. Geological Survey Water-Resources Investigations Report 92-4111, 1994.

⁷*Final Installation Restoration Program (IRP) Conceptual Hydrogeological Model Report for Langley Air Force Base*, Radian International LLC, May 1998.

⁸*Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A), Interim Final*, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC, EPA/540/1-89/002, 1989.